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COMMUNICATION

The European Patent Office herewith transmits as an enclosure the European search report for the above-mentioned European patent application.

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European Patent Office

SUPPLEMENTARY EUROPEAN SEARCH REPORT

Application Number
EP 00 90 2112

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	GB 1 245 456 A (ITEK CORPORATION) 8 September 1971 (1971-09-08) * page 3, line 55 - line 70 * * claim 8 *	1-51	B41N1/14 B41N1/00 B41C1/10

TECHNICAL FIELDS SEARCHED (Int.Cl.7)
B41N
B41C

The supplementary search report has been based on the last set of claims valid and available at the start of the search.

1

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 May 2004	Martins Lopes, L

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 90 2112

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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14-05-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1245456 A	08-09-1971	BE 722380 A	16-04-1969
		DE 1803670 A1	26-06-1969
		FR 1598170 A	06-07-1970
		NL 6814703 A	21-04-1969

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

PATENT SPECIFICATION

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(54) PLANOGRAPHIC PRINTING PLATE AND PROCESS FOR THE PRODUCTION THEREOF

(71) We, ITEK CORPORATION, a Corporation organized and existing under the laws of the State of Delaware, United States of America, of 10 Maguire Road, Lexington, Massachusetts, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to planographic printing plates, and, more specifically, to photographic planographic printing plates produced by thermographic processes.

A planographic printing plate is provided comprising a photoconductor which becomes reversibly activated upon exposure to activating radiation and a heat-sensitive composition which forms a oleophilic-hydrophilic image pattern upon selective imagewise application of heat. This printing plate is exposed imagewise to produce a latent image, then contacted with image-forming materials to convert the latent image to an irreversible image, and then uniformly exposed to heat producing activating radiation which causes selective heating in the image areas, thereby producing an oleophilic-hydrophilic image pattern. This oleophilic-hydrophilic image-bearing printing plate may then be used with polar solvent-based ink or a greasy or oil-base ink as a printing master.

Lithographic plates which may be rendered both ink-receptive and visibly distinct at image areas, thus permitting proofreading and proper positioning of the lithographic master prior to inking are known to the art. These lithographic or offset plates comprise a heat-sensitive composition comprising a continuous hydrophilic colloid phase and a disperse phase comprising a water-repellent, ink-receptive material which is released to the surface of the coating under the influence of pressure or heat. These plates also comprise materials which will produce a visible image upon exposure to activating radiation. For example, reactants such as ferric stearate and methylgallate are incorporated in the hydrophilic coating or the methylgallate may be contained on the transfer sheet. Interreaction of the two reactants during heating results in formation of a coloured reaction product providing an immediate visible readout.

The planographic printing plate of this invention may be rendered ink-receptive and visibly distinct. The visibly distinct image containing plate produced according to this invention is one having high resolution and sharp images with little or no background fog. Furthermore, the printing plate is one in which the contrast may be varied, one which has "add-on" capability, one which need not be produced in the dark and yet is sensitive to activating radiation such as visible light, and many other advantages which will be apparent from the following disclosure. The planographic printing plate of this invention comprises a photoconductor which becomes reversibly activated upon exposure to activating radiation and a heat-sensitive composition which forms an oleophilic-hydrophilic image pattern upon selective imagewise application of heat. The heat-sensitive composition of this invention comprises a material which will produce an oleophilic-hydrophilic image pattern upon selective imagewise application of heat and is preferably a hydrophilic continuous phase containing a disperse phase of oleophilic particles. The planographic printing process of this invention comprises exposing imagewise the above-described planographic printing plate to produce a latent image therein. This latent image bearing plate may then be contacted with image-forming material to thereby form an irreversible image which becomes preferentially heated when the printing plate is exposed to a uniform exposure

of heat-producing activating radiation such as infrared radiation or said latent image bearing plate may optionally be stored in an environment free of activating radiation to await further processing if desired. Finally, the printing plate containing the irreversible image is exposed to such heat-producing activating radiation, thereby causing selective heating in the image areas and thereby producing a planographic printing master having an oleophilic-hydrophilic image pattern. This planographic printing plate which contains the hydrophilic-oleophilic image pattern may be inked with either a hydrophilic printing ink or an oleophilic printing ink, depending upon the type of print desired. A hydrophilic ink is one such as disclosed in Belgian Patent Specification 676,898. Such an ink contains a polar solvent base such as water and contains coloring as, for example, black pigment. An oleophilic ink is an ink based upon an oily or greasy base and also contains colored matter such as black pigment.

The best source of heat producing electromagnetic radiation for producing good results with exposure times between 10^{-1} and 10^{-4} seconds are gas-discharge lamps emitting electromagnetic radiation having a wave length between about 0.3 microns to 1 micron. A suitable source of infrared light exposure is by means of a commercial thermographic copying apparatus.

The heat-sensitive composition is one which forms an oleophilic-hydrophilic image pattern upon selected imagewise application of heat. The heat-sensitive composition comprises a multiphase system comprising a high melting continuous phase and a low melting disperse phase. By selectively applying heat to the heat-sensitive layer so that the disperse phase melts and the high melting continuous phase does not melt, an image pattern corresponding to the disperse phase will be formed on the surface of the continuous phase. Therefore a hydrophilic continuous phase with an oleophilic disperse phase produces an oleophilic image pattern corresponding to those areas which have been heated to a temperature between the melting point of the disperse phase and the continuous phase. On the other hand, when the heat sensitive composition comprises an oleophilic continuous phase and a hydrophilic disperse phase, a hydrophilic image pattern is produced in those areas which are selectively heat-imaged to a temperature between the melting point of the disperse phase and the continuous phase. A preferred heat-sensitive composition comprises a polyphase system having a hydrophilic film-forming colloid as the continuous phase and a disperse phase of oleophilic water-repellent particles which forms an oleophilic image on a planographic surface when released to the surface of the coating from the polyphase system in the heat-imaged areas. Preferably the continuous phase comprises a water-permeable hydrophilic film-forming colloid. The disperse phase preferably comprises a finely-divided high molecular weight oleophilic polymer. Preferably this oleophilic polymer is in the form of latex particles which form a fragile, water-receptive and greasy ink-repellent film when deposited as a dried thin layer of latex and which is rendered water repellent and greasy ink receptive on being heated to the temperature between 35°C and 235°C.

Specific examples of a heat-sensitive composition suitable for this invention and comprising a hydrophilic continuous phase and an oleophilic disperse phase is that disclosed in Belgian Patent Specification 656,713.

The hydrophilic materials useful in the heat-sensitive composition of this invention include, for example, polyvinyl alcohol, ethylcellulose, carboxymethylcellulose, casein, gelatin, sodium alginate, water-soluble vegetable gums such as guar gum, synthetic polymers such as sodium or ammonium polyacrylate, and many other water-soluble hydrophilic film-forming colloids or colloidal agglutinants.

These hydrophilic materials may be insolubilized in order to improve their durability as a planographic plate surface by methods known to the art. For example, gelatin may be hardened by the addition of formaldehyde, polyvinyl alcohol is effectively insolubilized by dimethylolurea incorporated with the coating formulation, and sodium alginate or sodium polyacrylate may be effectively treated with a solution of zinc chloride applied over the dried coating.

Hydrophilic fillers useful for incorporating in the hydrophilic materials are clay, calcium carbonate, silica, infusorial earth, chalk, barium sulfate or satin white.

Oleophilic materials useful in the heat-sensitive composition of this invention include synthetic polymers such as polyethylene, polystyrene, polymethylmethacrylate, polyvinyl chloride, polyacrylonitrile and poly-(N-vinyl carbazole). These oleophilic hydrophobic polymers are preferably used in the form of latexes. When the disperse phase of a heat-sensitive composition comprises latex particles, these are generally surrounded by wetting or dispersing agents. It is believed that the wetting or dispersing agent provides a heat-sensitive composition which is especially suitable for allowing the image-forming materials to properly permeate the surface of the planographic printing plate, thereby providing excellent development of the latent images produced by exposure of the photoconductor layer. Additional materials which may be suitable for the oleophilic, hydrophobic phase of the

heat-sensitive composition are the oils or the waxes such as the vegetable, mineral, insect, petroleum, animal and synthetic waxes.

The ratio of the continuous phase of the heat-sensitive composition to the disperse phase of said composition will vary according to the nature of the continuous phase, the nature of the disperse phase, the nature of the ink being used and like factors known to the art. In general, however, the ratio of the disperse phase in respect to the continuous phase should pereferably be in excess of 1:1, and more preferably in excess of 3:2.

The heat-sensitive composition may be used in a separate layer from the photoconductor layer or it may be in the form of a mixture combining the photoconductor and the heat-sensitive composition in one layer. On the other hand, the multiphase heat-sensitive composition may also, in the alternative, be separated into separate layers. For example, the hydrophilic continuous phase may form a separate layer on top of an oleophilic layer.

The heat-producing activating radiation includes any type of radiation which upon exposure to a dark or visible surface will cause heating. For example, this would include infrared radiation or any electromagnetic radiation in the visible spectrum. The intensity and duration of the integral or non-differential light exposure are such that the surface recording layer is struck by a light energy of at least 0.01 Watt.sec/cm^2. To reduce lateral conduction of heat within the recording material the non-differential exposure is preferably very short. The exposure is preferably not more than 10^{-1} second in duration and even more preferably less than 10^{-2} second and the best results are obtained between 10^{-3} and 10^{-6} seconds. Such brief exposures require high energy radiation sources and preferably ones wherein the surface recording layer is struck by light energy of at least 0.1 Watt.sec/cm^2. To obtain exposure times between 10^{-1} and 10^{-6} seconds, it is generally desirable to use high energy radiation sources such as flash lamps. Gas discharge lamps which emit light in the wave length range from about 0.3μ to about 1μ are especially desirable.

The photoconductor or photocatalyst preferred in this invention are metal containing photoconductors. A preferred group of such photosensitive materials are the inorganic materials such as compounds of a metal and a non-metallic element of Group VIA of the periodic table such as oxides, such as zinc oxide, titanium dioxide, zirconium dioxide, germanium dioxide, indium trioxide; metal sulfides such as cadmium sulfide (CdS), zinc sulfide (ZnS) and tin disulfide (SnS_2); metal selenides such as cadmium selenide (CdSe). Metal oxides are especially preferred photoconductors of this group. Titanium dioxide is a preferred metal oxide because of its unexpectedly good results. Titanium dioxide having an average particle size less than about 250 millimicrons and which has been treated in an oxidizing atmosphere at a temperature between about 200°C and 950°C for from about 0.5 hours to about 30 hours is especially preferred, and more especially that titanium dioxide produced by high temperature pyrolysis of titanium halide.

Also useful in this invention as photoconductors are certain fluorescent materials. Such materials include, for example, compounds such as silver activated zinc sulfide, and zinc activated zinc oxide.

While the exact mechanism by which the photoconductors of this invention work is not known, it is believed that exposure of photoconductors or photocatalysts of this invention to activating means causes an electrons or electrons to be transferred from the valence band of the photoconductor or photocatalyst to the conductance band of the same or at least to some similar excited state whereby the electron is loosely held, thereby changing the photoconductor from an inactive form to an active form. If the active form of the photoconductor or photocatalyst is in the presence of an electron accepting compound a transfer of electrons will take place between the photographic and the electron accepting compound, thereby reducing the electron accepting compound. Therefore a simple test which may be used to determine whether or not materials have a photoconductor or photocatalytic effect is to mix the material in question with an aqueous solution of silver nitrate. Little, if any, reaction should take place in the absence of light. The mixture is then subjected to light. At the same time a control sample of an aqueous solution of silver nitrate alone is subjected to light, such as ultraviolet light. If the mixture darkens faster than the silver nitrate alone, that material is a photoconductor or photocatalyst.

It is evident that the gap between the valence and the conducting band of a compound determines the energy needed to make electron transitions. The more energy needed, the higher the frequency to which the photoconductor will respond. It is known to the art that it is possible to reduce the band-gap for these compounds by adding a foreign compound as an activator which either by virtue of its atomic dimensions or by possessing a particular electronic forbidden zone structure or through the presence of traps as donor levels in the intermediate zone between the valance and the conduction band stresses the electronic configuration of the photoconductive compound,

thereby reducing its band-gap and thus increasing its ability to release electrons to its conduction band. Phosphors almost necessarily imply the presence of such activating substances. The effect of such impurities may be such as to confer photoconductivity upon a compound which intrinsically is non-photoconductive. On the other hand, excessive impurity content can interfere with a compound acting as a photoconductor, as above described.

The photoconductors of this invention may be sensitized to visible and other wavelengths of light by foreign ion doping, addition of fluorescent materials, and/or by means of sensitizing dyes. Bleachable dyes useful for sensitizing the photoconductors of this invention include, for example, the cyanine dyes, the dicarbocyanine dyes, the carbocyanine dyes, and the hemicyanine dyes. Additional dyes which are useful for sensitizing the photosensitive medium of this invention are the cyanine dyes described on pages 371—429 in "The Theory of Photographic Process" by C. E. Kenneth Mees published by McMillan Company in 1952. Other useful dyes include those known to the art as triphenylmethane dyes such as crystal violet and basic Fuchsin, diphenylmethane dyes such as Auramine O, and Xanthene dyes such as Rhodamine B.

Irradiation sources which are useful in this invention for producing the initial latent image include any activating electromagnetic radiation. Thus actinic light, X-rays, or gamma rays are effective in exciting the photoconductor. Beams of electrons and other like particles may also be used in the place of the ordinary forms of electromagnetic radiation for forming an image according to this invention. These various activating means are designated by the term "activating radiation".

The base sheet components of the printing plate of this invention comprise any suitable backing of sufficient strength and durability to satisfactorily serve as a reproduction carrier. The base sheets may be in any form such as, sheets, ribbons and rolls. This sheet may be made of any suitable materials such as wood, rag content paper, pulp paper, plastics such as, for example, polyethylene terephthalate (Mylar) and cellulose-acetate, cloth, metal such as aluminum, and glass.

When the photoconductor comprises a separate layer from the heat-sensitive composition of this invention then it may be desirable to use a binder agent to bind the photoconductor to the base sheet. In general, these binders are translucent or transparent so as not to interfere with transmission of light therethrough. Preferred binder materials are organic materials such as resins or gelatin. Examples of suitable resins are butadiene-styrene copolymer, poly(alkyl acrylates) such as poly(methyl methacrylate) polyamides, polyvinyl acetate, polyvinyl alcohol and polyvinylpyrrolidone.

The photoconductor should be conditioned for exposure by storage in the dark from one to twenty-four hours prior to use, heating or other conditioning means known to the art. After conditioning, the photoconductor is not exposed to activating radiation prior to its exposure to activating radiation for recording an image pattern.

The period of exposure to form the latent image will depend upon the intensity of the light source, particular photoconductor, the type and amount of catalyst, if any, and like factors known to the art. In general, however, the exposure may vary from about 0.001 seconds to several minutes.

Image-forming materials which are useful in this invention are those such as described in U.S. Patent 3,152,903. These image-forming materials include preferably an oxidizing agent and a reducing agent. Such image-forming materials are often referred to in the art as physical developers. The oxidizing agent is generally the image-forming component of the image-forming material. However, this is not always the case. Either organic or inorganic oxidizing agents may be employed as the oxidizing components of the image-forming material. Preferred oxidizing agents comprise the reducible metal ions having at least the oxidizing power of cupric ion and include such metal ions as Ag^{+}, Hg^{++}, Pb^{+4}, Au^{+1}, Au^{+3}, Pt^{+4}, Pt^{+4}, Cu^{+1}, and Cu^{+2}. Other suitable oxidizing agents useful in this invention as components of an image-forming material are permanganate (MnO_4^-) ion, Ni^{+4}, Sn^{+2}, Pb^{+2}, various leuco dye materials such as disclosed in Specification No. 1,221,686. Organic oxidizing agents include tetrazolium salts, such as tetrazolium blue and red, and diphenyl carbazole, and genarcyl red 6B (methine dye).

The reducing agent component of the image-forming materials of this invention are inorganic compounds such as the oxalates, formates, and ethylenediaminetetra-acetate complexes of metals having variable valence; and organic compounds such as dihydroxybenzenes, aminophenols, and aminoanilines. Also, polyvinylpyrrolidone, hydrazine, and ascorbic acid may be used as reducing agents in this invention. Suitable specific reducing compounds include hydroquinone or derivatives thereof, o- and p-aminophenol, p-methyl-aminophenol sulphate, p-hydroxyphenyl glycine, o- and p- phenyldiamine, 1-phenyl-3-pyrazolidone, alkali and alkaline earth metal oxalates and formates.

Liquid redox systems are preferred for use as image-forming materials because of the excellent results obtained therewith. However, the image-forming materials of

this invention may include electrical toners such as described in British Patent No. 935,621, colored resins.

Additionally, the image-forming materials or physical developers may contain organic acids or alkali metal salts thereof, which can react with metal ions to form complex metal anions. Further, the developers may contain other complexing agents and the like to improve image formation and other properties found to be desirable in this art.

This invention above described is exemplified as follows:

EXAMPLE 1

A polyethylene terephthalate support is coated with a finely-divided titanium dioxide dispersed in a gelatin binder. This thus-coated support is then coated with a heat sensitive composition comprising:

10% aqueous soloution of gelatin, 20 milliliters;
40% aqueous dispersion of polyethylene having a particle size of 0.1 microns and an average molecular weight of 30,000, 10 milliliters:
3% aqueous solution of formaldehyde, 6—10 milliliter.

After drying the printing plate thus produced is exposed to an image pattern from an ultraviolet light source for 1—2 seconds duration, thereby giving an exposure of 400 meter candle seconds and producing a latent image on the printing plate.

The thus-exposed printing plate is then immersed 0.28 seconds in an aqueous solution of 0.32 molar silver nitrate, then immersed 0.6 seconds in an aqueous developing solution comprising metol (p-methylaminophenyl sulfate), then immersed in a sodium thiosulphate fixing bath.

This thus-imaged printing plate is then irradiated with an infrared radiation source in a thermographic copying machine. The image areas of the printing plate are heated and thereby converted from a hydrophilic to an oleophilic, hydrophobic surface. The non-image areas of the printing plate remain hydrophilic. An oil base ink is used with this printing plate to produce a negative copy of the original. A polar solvent based ink is used with this printing plate as a master for producing positive copies of the original.

EXAMPLE 2

A polyethylene terephthalate support is coated with a finely-divided titanium dioxide dispersed in a gelatin-polyethylene composition of the proportions and composition of Example 1. This substrate is then processed according to the procedure of Example 1 to produce a planographic printing master suitable for use with a hydrophilic or a greasy ink.

EXAMPLE 3

A paper support coated with a finely-divided titanium dioxide dispersed in a polyvinyl alcohol binder is coated with a heat-sensitive composition comprising polyvinyl alcohol hardened with dimethylolurea as a hydrophilic continuous phase and a finely-divided high molecular weight polystyrene latex as a discontinuous oleophilic phase. The thus-prepared printing plate is exposed to an image pattern of activating ultraviolet radiation to produce a latent image thereon. This printing plate is then stored for one week in an environment having an absence of activating radiation. But by this time the latent image has decayed. Therefore this decayed planographic printing plate is flooded with light of a wavelength 4800 Å at an intensity of 50 micro watts/cm² for 1 minute and then dipped in a saturated solution of silver nitrate in methanol followed by dipping into a solution comprising 5 grams of phenidone, 40 grams of citric acid monohydrate and 1 liter of methanol.

This developed printing plate is then exposed briefly to an infrared radiation source, thereby causing the hydrophilic surface to be converted to a hydrophobic surface in the image areas of the printing plate. This printing plate is then used with a polar solvent-based ink as a printing master to produce copies which are positives of the original. This same printing plate is then washed and used as a printing master with an oil-based ink to produce negative copies of the original.

EXAMPLE 4

A printing plate is prepared as in Example 3 except that the printing plate is dye-sensitized with 2-p-dimethylaminostyryl-4-methylthiazole methochloride and silver nitrate is added to the printing plate prior to exposure to the image pattern of activating radiation. This printing plate is then exposed to an image pattern of activating radiation in the visible light range from a tungsten light source and contacted with an aqueous developing solution comprising metol (p-methylaminophenoyl sulfate), and then immersed in a combined dye bleaching and fixer-stabilizer bath of the following composition for 1 second:

potassium sulfite (K_2SO_3) 200 grams,
sodium thiosulfate ($Na_2S_2O_3 5H_2O$) 200 grams,
glacial acetic acid, 23 milliliters and then dilute to one liter with water.

This thus-developed printing plate provides a print having good density, excellent resolution and excellent continuous tone. This print is the negative of the original. The developed printing plate is then exposed

to a high intensity flash lamp thereby heating the areas above the image areas to convert the hydrophilic surface to an oleophilic surface in the image areas. This printing plate containing an oleophilic-hydrophilic image pattern is used with an oil-based ink to produce negative copies of the original and is used with a polar solvent-based ink to produce positive copies of the original.

WHAT WE CLAIM IS:—

1. A planographic printing plate comprising a photoconductor which becomes reversibly activated and capable of being made heat producing in developed image areas corresponding to the reversibly activated areas of the printing plate upon exposure to activating radiation and a heat-sensitive composition comprising a high melting continuous phase and a low melting disperse phase which forms an oleophilic-hydrophilic image pattern upon selective application of heat.

2. Printing plate as in Claim 1 wherein the heat-sensitive composition froms a normally hydrophilic planographic surface of said plate and comprises particles of oleophilic, water-repellent particles dispersed within a continuous phase of a hydrophilic binder and forms an oleophilic image on the planographic surface on application of heat.

3. Printing plate as in Claim 1 or Claim 2 wherein said heat-sensitive composition comprises a hydrophilic film-forming colloid as the continuous phase and a disperse phase of oleophilic, water-repellent particles which forms an oleophilic image on the planographic surface on application of heat.

4. Printing plate as in any of Claims 1—3 wherein said photoconductor is a metal-containing photoconductor.

5. Printing plate as in any of Claims 1—4 wherein said heat-sensitive composition comprises a hydrophilic filler.

6. Printing plate as in any of Claims 1—5 wherein said continuous phase comprises an insoluble hydrophilic film-forming colloid and wherein said disperse phase comprises a finely-divided high molecular weight oleophilic polymer.

7. Printing plate as in Claim 6 wherein said high molecular weight oleophilic polymer comprises polymer latex particles which form a fragile water-receptive and greasy ink-repellent film when deposited as a dried thin layer of said latex, said film being rendered water-repellent and greasy ink-receptive on being heated to a temperature between 35°C and 235°C.

8. Printing plate as in any of Claims 1—7 wherein said photoconductor is titanium dioxide.

9. Printing plate as in Claim 7 which includes image-forming materials that chemically react to form an irreversible image when exposed in the presence of said photoconductor to activating radiation.

10. Printing plate as in Claim 9 wherein the image-forming materials comprise a reducing agent and an oxidizing agent having at least the oxidising power of cupric ion.

11. Printing plate as in any of Claims 1—10 wherein the photoconductor and heat-sensitive composition are in separate layers.

12. Printing plate as in any of Claims 1—11 including a support therefor.

13. Printing plate as in any of Claims 1—12 including a visible image deposited on said photoconductor.

14. Printing plate as in Claim 13 wherein the visible image is an irreversible image capable of preferentially generating heat upon exposure to heat producing radiation and wherein the image corresponds to an image pattern of previously-applied activating radiation.

15. Printing plate as in Claim 14 including a hydrophilic-oleophilic image pattern on the surface of the plate.

16. Printing plate as in Claim 15 wherein the image is oleophilic.

17. A planographic printing process comprising (1) exposing a planographic printing plate comprising a photoconductor and a heat-sensitive composition which forms an oleophilic-hydrophilic image pattern upon selective imagewise application of heat to form a latent image, (2) contacting said latent image with image-forming materials which form an irreversible image capable of becoming preferentially heated, (3) generating heat in the image areas and thereby producing a planographic printing master having an oleophilic-hydrophilic image pattern.

18. A planographic printing process comprising (1) exposing a planographic printing plate comprising a photoconductor and a heat-sensitive composition having a hydrophilic surface which becomes oleophilic on heating to form a latent image, (2) contacting said latent image with image-forming materials which convert the latent image to a visible image which is selectively heated when the said printing plate is exposed to activating radiation, and (3) uniformly exposing the printing plate to activating radiation to cause selective heating in the image areas which converts the hydrophilic surface of the printing plate in the image areas to an oleophilic surface.

19. Process as in Claim 18 wherein the uniform exposure of activating radiation which causes selective heating in the image areas is infrared radiation or visible light.

20. Process as in Claim 18 or Claim 19 wherein said photoconductor comprises titanium dioxide.

21. Process as in any of Claims 17—20 wherein said heat-sensitive composition com-

prises gelatin and high molecular weight polyethylene.

22. Process as in any of Claims 17—21 wherein the printing plate containing oleophilic-hydrophilic image portions is inked and used as a printing master.

23. Printing process as in any of Claims 17—22 wherein said image-forming materials are in combination with the photoconductor and upon exposure to activating radiation form a visible reaction product.

24. A process as in Claim 23 wherein additional image-forming materials are added subsequent to the exposure step to produce a visible image in the exposed portions.

25. Planographic printing plates comprising a photoconductor and a heat-sensitive composition substantially as hereindescribed.

26. A planographic printing process employing a printing plate as in any of Claims 1—16.

27. Printed matter whenever produced with a printing plate as in any of Claims 1—16.

28. Developed printing plates comprising a photoconductor and a heat-sensitive composition substantially as hereindescribed.

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